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(21)Application number : 08-283635 (71)Applicant : KONICA CORP
(22)Date of filing : 25.10.1996 (72)Inventor : SAITO YOICHI
TSUCHIYA MASARU
MOCHIZUKI YOSHIHIRO

(54) INK JET RECORDING PAPER

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an air gap structure, having high ink absorbing property by employing necessary minimum fine solid particles and hydrophilic binder by a method wherein an air gap layer is formed of the soft aggregation or the hydrophilic binder and inorganic fine particles while the hydrophilic binder is crosslinked by hardener.

SOLUTION: An air gap structure is formed in a skin film by forming a soft aggregation by a method wherein primary ultrafine particles under a dispersed condition in water solution containing a hydrophilic binder preferably are passed through mutually aggregated condition in a comparatively limited condition of the contacting point thereof. When the primary ultrafine particles are formed in a water solution having a water-soluble binder capable of effecting weak combination between the surface of the primary grains, the amount of air gaps is comparatively easily controlled and formed in a stable, larger amount of air gaps, compared with the amount of fine particles used in this procedure, can be obtained and, further, a film having a high property of luster can be obtained. In this case, the film is hardened by a hardener to obtain a film, having a high void volume without deteriorating the brittleness of the film.

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CLAIMS

[Claim(s)]

[Claim 1] The ink jet record form characterized by having the opening layer in which this opening layer was formed of the flocculation of a hydrophilic binder and a non-subtlety particle on the base material in the ink jet record form which has at least one-layer opening layer, and the bridge being constructed over this hydrophilic binder by the hardening agent.

[Claim 2] The ink jet record form according to claim 1 characterized by being at least one sort of compounds with which said hydrophilic binder is chosen from polyvinyl alcohol and/or cation conversion polyvinyl alcohol.

[Claim 3] The ink jet record form according to claim 2 characterized by the average degree of polymerization of at least one sort of compounds chosen from said polyvinyl alcohol and/or cation conversion polyvinyl alcohol being 1000 or more.

[Claim 4] The ink jet record form according to claim 1, 2, or 3 with which the non-subtlety particle which said opening layer contains is characterized by being the silica whose mean particle diameter is 5-50nm.

[Claim 5] An ink jet record form given in any 1 term of claims 1-4 characterized by said hardening agents being at least one sort of hardening agents chosen from a way acid or its salt, and/or Pori epoxy compound.

[Claim 6] An ink jet record form given in any 1 term of claims 1-5 characterized by for said opening layer having at least two hydroxyl groups in a molecule, and molecular weight containing 300 or less polyols.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink jet record form which has improved the brittleness of a coat and attained altitude spare time capacity in the ink jet record form with which especially an ink absorption layer consists of an opening layer which has high ink absorptivity about the ink jet record form which records using water color ink.

[0002]

[Description of the Prior Art] although ink jet record makes the minute drop of ink fly by various working principles, and is made to adhere to record sheets, such as paper, and an image, an alphabetic character, etc. are recorded, a high speed, the low noise, and multiple-color-izing are comparatively easy --- etc. --- it has the advantage. About the blinding of a nozzle and the maintenance which had become a problem from the former by this method, from both sides of ink and equipment, amelioration progresses and it has spread through various fields, such as various printers, facsimile, and a computer terminal, quickly in current.

[0003] As an ink jet record form used by this ink jet recording method, also when a printing dot laps [that a color tone is brightly skillful and absorption of ink] early, the diffusion to the longitudinal direction of ink flowing out or not spreading and a printing dot is not large [the concentration of a printing dot is high, and] beyond the need, and it is required that the circumference should be smooth and should not fade etc.

[0004] Since it becomes nonuniformity, and the color of each other in the border area of a color which a drop causes a HAJIKI phenomenon on an ink jet record form, and is different spreads and it is easy to reduce image quality greatly in case the liquid ink drop of two or more colors laps and is recorded, when especially ink rate of absorption is slow, it is required to give ink absorptivity high as an ink jet record form.

[0005] In order to solve these problems, very many techniques are proposed from the former.

[0006] For example, the ink jet record form which carried out humidity of the coating for surface treatment to the low size stencil paper indicated by JP,52-53012,A, The ink jet record form which prepared the coated layer of ink absorptivity in the support surface indicated by JP,55-5830,A, The ink jet record form which contains non-colloid silica powder as a pigment in the covered layer indicated by JP,56-157,A, The ink jet record form which used together the inorganic pigment indicated by JP,57-107878,A and the organic pigment, The ink jet record form which has two hole distribution peaks indicated by JP,58-110287,A, The ink jet record form which consists of a vertical two-layer porous layer indicated by JP,62-111782,A, The ink jet record form which has the indeterminate form crack indicated by JP,59-68292,A, 59-123696, 60-18383, etc., The ink jet record form which has the impalpable powder layer indicated by JP,61-135786,A, 61-148092, 62-149475, etc., JP,63-252779,A, JP,1-108083,A, 2-136279, The ink jet record form containing the pigment which has the specific physical-properties value indicated by 3-65376, 3-27976, etc., or a particle silica, JP,57-14091,A, 60-219083, 60-210984, 61-20797, 61-188183, JP,5-278324,A, 6-92011, 6-183134, 7-137431, The ink jet record form containing particle silicas, such as a colloid silica indicated by 7-276789 etc., And JP,2-276671,A, 3-67684, 3-215082, Many ink jet record forms containing the hydrated alumina particle

indicated by 3-251488, 4-67986, 4-263983, 5-16517, etc. are known.

[0007] Generally various kinds of above-mentioned approaches form an opening into a coat, ink is not made to absorb there, and a coat is hardly swollen at the time of ink absorption. For this reason, in case the coat by opening formation receives ink, the amount of openings will be theoretically restricted to below the thickness of a coat.

[0008] For example, in the coat whose desiccation thickness is 40 micrometers, if solid content assumes the coat which is 22 micrometers temporarily as uniform volume, the amount of openings will not have only =18ml/m² per two (40-22) 1m of ink jet record forms, and although based also on a recording method, the case where ink absorption capacity may be insufficient near the amount of the maximum ink will produce it.

[0009] When ink absorption capacity runs short, liquid ink is full of a recording paper front face, and it becomes impossible to obtain a clear image.

[0010] In the coat which has opening structure, in order to attain high void volume, it is most effective to increase spreading thickness, but there is not only disadvantage manufacture top cost increases in this case, but since solid content also increases together, curl and brittleness (film adhesive property [especially as opposed to the crack or base material under damp]) of a coat tend to fall greatly.

[0011] For this reason, as many openings as possible are formed using solid content, such as a binder of the minimal dose, and, as for the whole desiccation thickness, decreasing as much as possible is desirable.

[0012] Although the direct approach of raising the void volume to solid content, such as a binder, is making the rate of a non-subtlety particle to a hydrophilic binder increase and it is not using solid content unnecessary otherwise as much as possible, there is a trouble that the brittleness of a coat deteriorates extremely in this case.

[0013] If the brittleness of a coat deteriorates, coat peeling will arise at the time of the time of the handling of an ink jet record form, feeding in an ink jet printer, or conveyance, or a crack will arise, and the serious fault that an image spreads in accordance with this crack will be produced.

[0014] On the other hand, many ink jet record forms of the type which absorbs ink and is held in a swelling operation of the binder of an ink absorption layer are also known, without preparing an opening into a coat.

[0015] For example, many the recording papers, films, etc. which applied hydrophilic binders, such as gelatin, casein, starch, an alginic acid, polyvinyl alcohol, various kinds of conversion polyvinyl alcohol, a polyvinyl pyrrolidone, polyethylene oxide, polypropylene oxide, a carboxymethyl cellulose, HIDOROKI ethyl cellulose, a dextran, and a pullulan, on the base material as binders are known from the former.

[0016] The clear image in which these ink jet record forms had high glossiness and optical density is obtained. Moreover, although there is an advantage which can essentially hold a high ink absorption capacity in order to receive liquid ink in the swelling operation over the liquid ink of the binder of a coat Ink rate of absorption is inferior compared with the ink jet record form which has opening structure, and has the fault from which the rough deposit by crawling of liquid ink drops tends to arise in the part to which printing of the amount of high ink was carried out especially.

[0017]

[Problem(s) to be Solved by the Invention] The technical problem which this invention is made in view of the above-mentioned actual condition, and this invention tends to solve is to offer the ink jet record form which has the opening structure of high ink absorptivity by the solid-state particle of the need minimum, and use of a hydrophilic binder.

[0018]

[Means for Solving the Problem] The above-mentioned purpose of this invention is attained by the following configurations.

[0019] 1. Ink jet record form characterized by having opening layer in which this opening layer was formed of flocculation of hydrophilic binder and non-subtlety particle on base material in ink jet record form which has at least one-layer opening layer, and bridge being constructed over

this hydrophilic binder by hardening agent.

[0020] 2. Ink jet record form given in said 1 characterized by being at least one sort of compounds with which said hydrophilic binder is chosen from polyvinyl alcohol and/or cation conversion polyvinyl alcohol.

[0021] 3. Ink jet record form given in said 2 characterized by average degree of polymerization of at least one sort of compounds chosen from said polyvinyl alcohol and/or cation conversion polyvinyl alcohol being 1000 or more.

[0022] 4. Said 1 and 2 to which non-subtlety particle which said opening layer contains is characterized by being silica whose mean particle diameter is 5-50nm, or ink jet record form given in 3.

[0023] 5. Ink jet record form given in said any 1 term of 1-4 characterized by said hardening agents being at least one sort of hardening agents chosen from wavy acid or its salt, and/or Pori epoxy compound.

[0024] 6. Ink jet record form given in said any 1 term of 1-5 characterized by for said opening layer having at least two hydroxyl groups in molecule, and molecular weight containing 300 or less polyols.

[0025] Hereafter, this invention is explained to a detail.

[0026] The opening layer which the ink jet record form of this invention has is formed of the binder of a hydrophilic property, and the flocculation of a non-subtlety particle.

[0027] The uniform coating liquid which various the approaches of forming an opening into a coat are learned, for example, contains the polymer beyond **2 sort is conventionally applied on a base material. How to make carry out phase separation of these polymers mutually in a desiccation process, and form an opening, ** Apply the coating liquid containing a solid-state particle and a hydrophilic property, or a hydrophobic binder on a base material. How to immerse in the liquid containing water or a suitable organic solvent in an ink jet record form, make dissolve a solid-state particle, and create an opening after desiccation, ** After applying the coating liquid containing the compound which has the property which foams at the time of coat formation, The approach of making this compound foam in a desiccation process, and forming an opening into a coat and the coating liquid containing ** porosity solid-state particle and a hydrophilic binder are applied on a base material. How to form an opening between the inside of a porosity particle, or a particle, ** Or apply the coating liquid containing a particle oil droplet and a hydrophilic binder on a base material. the solid-state particle which has the volume more than equivalence (preferably 1.0 or more times) in general to a hydrophilic binder -- and -- between solid-state particles The approach ** mean particle diameter used for the approach and this invention which create an opening carries out flocculation of inorganic solid-state particle about 0.1 micrometers or less at the time of coating liquid preparation or coat formation, forms a secondary particle or the three-dimensional structure, and creates an opening etc. is learned.

[0028] In the ink jet record form of this invention, the opening formation approach by the approach of forming the flocculation of ** is used also in having described above from viewpoints, such as high voidage to high glossiness and desiccation thickness, and stability under preservation of opening structure.

[0029] As for the approach of forming the flocculation used by this invention and forming opening structure into a coat, the primary ultrafine particle in a distributed condition is formed into the water solution which contains a hydrophilic binder preferably via the condition that a point of contact condenses each other in the condition of having been restricted comparatively.

[0030] that such flocculation structure is linear or the condition that what formed floc in the shape of branching was distributed in the water solution -- or the condition of such flocs condensing each other further and taking the three-dimension network structure in a water solution is included.

[0031] Even if it is which case, detailed opening structure can be formed into the formed coat by carrying out spreading desiccation of this water solution on a base material.

[0032] Thus, in general, from the magnitude of a primary particle, the magnitude of the detailed opening in the obtained coat is about several times those magnitude of this, and has the description which is the opening of detailed magnitude.

[0033] It is formed in the water solution which has the approach of being hard to condense a primary particle to each other, carrying out ultralow-volume addition of the hydrophilic polymer which accelerates condensation of a particle in the water solution containing the hydrophilic binder which can exist in stability as an approach of forming such flocculation structure, for example, and forming condensation slightly, or the water-soluble binder which can perform a primary particle front face and weak coupling.

[0034] It is desirable from that the latter approach tends to form the amount of an opening in stability especially in this invention that it is comparatively easy to control, that more amounts of openings are obtained as compared with the amount of the particle to be used, and a coat with the still higher glossiness of a coat being obtained.

[0035] When forming an opening by the latter approach, it is desirable from glossiness with higher using a 0.003–0.05-micrometer primary particle in general as a particle size of a primary particle being acquired. Especially a desirable primary particle is a 0.004 micrometers – 0.02 micrometers thing.

[0036] As a non-subtlety particle of this invention, various smectite clay (for example, clay indicated by JP,7-81210,A, 6-184998, etc.), such as silicate, such as a silica, a magnesium silicate, and a calcium silicate, an aluminum hydroxide, zinc hydroxide, and synthetic hectorite, etc. is mentioned, for example.

[0037] Moreover, as a hydrophilic binder of this invention, various well-known hydrophilic binders are used conventionally. For example, gelatin or a gelatin derivative, a polyvinyl pyrrolidone (about 200,000 or more have desirable average molecular weight), A pullulan, polyvinyl alcohol, or its derivative (about 20,000 or more have desirable average molecular weight), A polyethylene glycol (100,000 or more have a desirable mean molecular weight), a carboxymethyl cellulose, Hydroxyethyl cellulose, a dextran, a dextrin, polyacrylic acid, and its salt, An agar, a kappa carrageenan, lambda-carrageenan, iota-carrageenan, xanthene gum, A polyalkylene oxide system copolymeric polymer given in locust bean gum, an alginic acid, gum arabic, a pullulan, JP,7-195826,A, and 7-9757. Polymers, such as independent or a copolymer which repeats and has these vinyl monomers of the vinyl monomer which has the carboxyl group and sulfonic group of a publication, can be mentioned to a water-soluble polyvinyl butyral or JP,62-245260,A. These hydrophilic binders may be used independently and may use two or more sorts together.

[0038] Especially a desirable hydrophilic binder is polyvinyl alcohol or cation conversion polyvinyl alcohol.

[0039] The polyvinyl alcohol preferably used by this invention has desirable average degree of polymerization from the brittleness of the coat from which the thing of 300–4000 is preferably used, and 1000 or more things are obtained especially for average molecular weight being good. Moreover, whenever [saponification / of polyvinyl alcohol] has 70 – 100% of desirable thing, and 80 – 100% of especially its thing is desirable. Moreover, cation denaturation polyvinyl alcohol is obtained by saponifying the copolymer of the ethylenic unsaturated monomer and vinyl acetate which have a cationic radical.

[0040] As an ethylenic unsaturated monomer which has a cationic radical For example, TORIMECHIRU-(2-acrylamide -2, 2-dimethyl ethyl) ammoniumchloride, TORIMECHIRU-(3-acrylamide -3, 3-dimethyl propyl) ammoniumchloride, N-vinyl imidazole, N-vinyl-2-methylimidazole, N-(3-dimethylaminopropyl) methacrylamide, Hydroxyl ethyl trimethylammonium chloride, TORIMECHIRU-(methacrylamide propyl) ammoniumchloride, N-(1 and 1-dimethyl-3-dimethylaminopropyl) acrylamide, etc. are mentioned.

[0041] the ratio of the cation denaturation radical content monomer of cation denaturation polyvinyl alcohol -- vinyl acetate -- receiving -- 0.1–10-mol % -- it is 0.2–5-mol % preferably.

[0042] the polymerization degree of cation denaturation polyvinyl alcohol -- usually -- 500–4000 -- 1000–4000 are preferably desirable.

[0043] whenever [moreover, / saponification / of cation conversion polyvinyl alcohol] -- usually -- 60–100-mol % -- it is 70–99-mol % preferably.

[0044] It is the case where especially a desirable thing uses a particle silica as a primary particle by this invention, and polyvinyl alcohol or denaturation polyvinyl alcohol is used as a hydrophilic binder. In this case, hydrogen bond with weak silanol group of a particle silica front face and

hydroxyl group of vinyl alcohol is performed, and a flocculation object is formed.

[0045] Especially as a primary particle silica, a thing 0.02 micrometers or less has especially desirable mean particle diameter, and what is 0.015–0.006nm is the most desirable. Moreover, as a secondary particle which these connected, it is desirable to make it preferably set to about 0.03–0.1 micrometers 0.02–0.2 micrometers.

[0046] The particle silica by which such a particle silica was compounded by the synthetic approach usually called a gaseous-phase method is used preferably.

[0047] In this invention, a hydrophilic binder especially desirable although flocculation structure is formed is polyvinyl alcohol.

[0048] In a weight ratio, the ratios of said hydrophilic binder and said inorganic solid-state particle are 1:15–1:1 in general, and the range of them is 1:10–1:2 preferably.

[0049] The example of the approach is explained below about the case where the coat which contains a flocculation object using polyvinyl alcohol and a particle silica is formed.

[0050] In the polyvinyl alcohol water solution (in general 3 – 15%) which maintained pH at 6–8, and the temperature of about 40 degrees C, it adds gradually, strong-agitating silica particle dispersion liquid (in general 5 – 15%), and an ultrasonic disperser, a high-speed homogenizer, etc. distribute after addition termination. In this case, it is convenient to use the organic solvent of water miscibilities, such as various kinds of surface active agents, a methanol, an acetone, and ethyl acetate, if needed, when preparing uniform coating liquid.

[0051] Subsequently, after adding various kinds of additives, it adjusts to viscosity required for spreading, and the coat which has the above-mentioned opening by applying and drying by the well-known approach on a base material is obtained.

[0052] The ink jet record form of this invention requires that the dura mater of said hydrophilic binder should be carried out by the hardening agent, in order to obtain high voidage, without degrading the brittleness of a coat.

[0053] Generally, a hardening agent is the compound which promotes the reaction of different radicals which said hydrophilic binder, the compound which has the radical which can react, or a hydrophilic binder has, according to the class of hydrophilic binder, is chosen suitably and used.

[0054] as the example of a hardening agent -- for example, an epoxy system hardening agent (diglycidyl ethyl ether --) Ethylene glycol diglycidyl ether, 1,4-butanediol diglycidyl ether, A 1, 6-diglycidyl cyclohexane, N, and N-diglycidyl 4-glycidyloxy aniline, Sorbitol polyglycidyl ether, glycerol polyglycidyl ether, etc., Aldehyde system hardening agents (formaldehyde, glyoxal, etc.), an activity halogen system hardening agent (2, 4-dichloro-4-hydroxy – 1, 3, 5-s-triazine, etc.), An activity vinyl system compound, way acids (1, 3, 5-tris acryloyl-hexahydro-s-triazine, bisvinyl-sulfonyl methylether, etc.) and the salt of those, way sand, aluminum alum, etc. are mentioned.

[0055] When using at least one sort of compounds especially chosen from polyvinyl alcohol and/or cation conversion polyvinyl alcohol as a desirable hydrophilic binder, it is desirable to use at least one sort of hardening agents chosen from a way acid and its salt, and/or an epoxy system hardening agent.

[0056] The hardening agent chosen from a way acid and its salt is the most desirable.

[0057] By this invention, as a way acid or its salt, the oxygen acid which uses a boron atom as a neutral atom, and its salt are shown, and an alt-way acid, a 2 way acid, a meta-way acid, tetraboric acid, a 5 way acid, 8 way acids, and those salts are specifically contained.

[0058] Although the amount of the above-mentioned hardening agent used changes with the class of hydrophilic binder, the class of hardening agent, the class of non-subtlety particle, the ratios to a hydrophilic binder, etc., it is 5–100mg preferably 1–200mg per hydrophilic binder 1g in general.

[0059] The above-mentioned hardening agent may be added in the coating liquid which forms the layer of others which reach among the coating liquid of the opening stratification, or adjoin an opening layer in case the coating liquid which constitutes an opening layer is applied. Or although the coating liquid which forms said opening layer on the base material which has applied the coating liquid which contains a hardening agent beforehand can be applied, or the overcoat of the hardening agent solution can be carried out for hardening agent the coating liquid of not

containing [which forms an opening layer further], after spreading desiccation and a hardening agent can be supplied to an opening layer It is desirable to supply a hardening agent to to add a hardening agent and to form an opening layer preferably, into the coating liquid of the layer which adjoins the coating liquid or this which forms an opening layer, from the effectiveness on manufacture and a viewpoint of the cracking crack prevention at the time of formation of an opening layer, and coincidence.

[0060] Especially, the hardening agent is beforehand added in the coating liquid which forms an opening layer in the desirable mode an ultrafine particle silica and polyvinyl alcohol form [mode] an opening layer, and if it applies and dries on a base material after carrying out fixed time amount (preferably 10 minutes or more, especially preferably 30 minutes or more) progress, higher voidage can be attained, without worsening the brittleness of a coat.

[0061] The ink jet record form of this invention can obtain the opening layer in which the brittleness of a coat has been improved further, when an opening layer has at least two hydroxyl groups in a molecule further and molecular weight contains 300 or less polyols.

[0062] As such polyols, ethylene glycol, a diethylene glycol, and a mean molecular weight can mention 300 or less polyethylene glycol, a glycerol, butanediol, butane triol, triethanolamine, etc.

[0063] As for the amount of the above-mentioned polyols used, per [0.01-2g] hydrophilic binder 1g are desirable, and it is the range of 0.05-1g more preferably.

[0064] The ink jet record form of this invention has the remarkable effectiveness of this invention especially in the ink jet record approach of as [whose amount of the maximum ink is two or more 20 ml/m per two 1m of ink jet record forms].

[0065] The void volume of the ink jet record form of this invention has the desirable thing of the maximum ink capacity printed which it has especially 95% or more 90% or more. Moreover, the desiccation thickness of the ink absorbing layer which constitutes an opening layer is desirable in order that making it 50 micrometers or less in general may not worsen the physical characteristic of coats, such as a crack.

[0066] On the other hand, as for the ratio to the capacity of the whole opening layer of void volume, it is desirable from the physical reinforcement and the brittle viewpoint of a coat to carry out to below 70 capacity % in general.

[0067] The amount of the range of 20 - 30 ml/m² is suitable for the ink jet record form of this invention as void volume with which are satisfied of the above-mentioned conditions.

[0068] In the layer of others which are prepared if needed [an opening layer and if needed] for this invention, various kinds of additives can be added besides having described above.

[0069] For example, polystyrene, polyacrylic ester, and polymethacrylic acid ester, Polyacrylamides, polyethylene, polypropylene, a polyvinyl chloride, Organic latex particles, such as polyvinylidene chlorides or these copolymers, a urea-resin, or melamine resin, A liquid paraffin, dioctyl phthalate, tricresyl phosphate, Various surfactants, such as oil droplet particles, such as a silicone oil, an anion, a cation, and Nonion, An ultraviolet ray absorbent given in JP,57-74193,A, 57-87988, and 62-261476, JP,57-74192,A, 57-87989, 60-72785, The fading inhibitor indicated by 61-146591, JP,1-95091,A, 3-13376, etc., JP,59-42993,A, 59-52689, 62-280069, The fluorescent brightener indicated by 61-242871, JP,4-219266,A, etc., Various well-known additives, such as pH regulators, such as a sulfuric acid, a phosphoric acid, a citric acid, a sodium hydroxide, a potassium hydroxide, and potassium carbonate, a defoaming agent, antiseptics, a thickener, an antistatic agent, and a mat agent, can also be made to contain.

[0070] Into the configuration layer of the arbitration by the side of the ink recording surface of this invention, an alkali-metal weak acid salt the poly allylamine of publications, such as the poly cation polyelectrolyte of JP,56-84992,A, a basic latex polymer of JP,57-36692,A, JP,4-15744,B, JP,61-58788,A, and 62-174184, and given in JP,61-47290,A etc. can be used more than a kind as a deck-watertight-luminaire-ized agent of an image.

[0071] The above and an opening layer may consist of more than two-layer, and as long as there is a configuration of those opening layers within limits mentioned above in this case, you may differ.

[0072] Although a thing well-known as a record form for ink jets can be conventionally used suitably as a base material of an ink jet record form by this invention, in order to obtain a clear

image by higher concentration, it is desirable to use the hydrophobic base material with which liquid ink does not permeate into a base material.

[0073] The thing of a property which bears the radiant heat when the film which consists of ingredients, such as polyester system resin, diacetate system resin, triacetate system resin, acrylic resin, polycarbonate system resin, polyvinyl chloride system resin, polyimide system resin, cellophane, and celluloid, being mentioned as a transparence base material, for example, and being used as an OHP especially is desirable, and especially polyethylene terephthalate is desirable. As thickness of such a transparent base material, about 10-200 micrometers is desirable. It is desirable from an adhesive viewpoint of an ink absorbing layer, a back layer, and a base material to prepare a well-known under-coating layer in an ink absorbing layer [of a transparence base material] and back layer side.

[0074] Moreover, the so-called White pet which comes to add white pigments to the resin covering paper (the so-called RC paper) which has the polyolefin resin enveloping layer which added white pigments etc. at least to one side of a base paper as a base material used when there is no transparent need, for example, and polyethylene terephthalate is desirable.

[0075] It is desirable to perform corona discharge treatment, undercoating processing, etc. to a base material in advance of spreading of an ink absorbing layer for the purpose, such as to enlarge bond strength of the above-mentioned base material and an ink television layer. Furthermore, the record sheet of this invention does not necessarily need to be colorlessness, and may be a colored record sheet.

[0076] In photograph image quality, near and especially since the image of high quality is moreover obtained by low cost, as for a record image, it is desirable to use the paper base material which laminated both sides of a stencil paper base material with polyethylene in the ink jet record form of this invention. The paper base material laminated with such polyethylene is explained below.

[0077] The stencil paper used for a paper base material uses wood pulp as the main raw material, and, in addition to wood pulp, paper making is carried out using synthetic fibers, such as synthetic pulps, such as polypropylene, or nylon, and polyester, if needed. Although both LBKP, LBSP, NBKP, NBSP LDP and NDP LUKP and NUKP can be used as wood pulp, it is desirable to use more many [for a staple fiber] LBKP, NBSP(s), LBSP(s), and NDP(s) and LDP(s). However, it reaches LBSP or the ratio of LDP has 10 % of the weight or more and 70 desirable % of the weight or less.

[0078] The pulp of the above-mentioned pulp which chemical pulp with few impurities (sulfate pulp and sulfite pulp) was used preferably, and performed bleaching processing, and raised the whiteness degree is also useful.

[0079] Hara Kaminaka can add suitably flexible-ized agents, such as moisture hold-back agents, such as paper reinforcing agents, such as white pigments, such as sizing compounds, such as a higher fatty acid and an alkyl ketene dimer, a calcium carbonate, talc, and titanium oxide, starch, polyacrylamide, and polyvinyl alcohol, a fluorescent brightener, and polyethylene glycols, a dispersant, and the 4th class ammonium, etc.

[0080] The freshness of the pulp used for paper making has desirable 200-500 cc by convention of CSF, and 30 thru/or 70% have the desirable sum of 24-mesh residue weight % and weight % for 42-mesh ** as which the fiber length after beating is specified to JIS-P-8207. In addition, as for weight % of the four-mesh residue, it is desirable that it is 20 or less % of the weight.

[0081] The basis weight of stencil paper has 30 thru/or desirable 250g, and 50 thru/or especially its 200g are desirable. The thickness of stencil paper has 40 thru/or desirable 250 micrometers.

[0082] After a paper-making phase or paper making, calender processing of the stencil paper can be carried out, and it can also give the Takahira slippage. A stencil paper consistency has 0.7 thru/or common 1.2 g/m² (JIS-P-8118). Furthermore, stencil paper stiffness has 20 thru/or desirable 200g on the conditions specified to JIS-P-8143.

[0083] A surface sizing compound may be applied to a stencil paper front face, and the sizing compound same as a surface sizing compound as said size which can carry out the Hara Kaminaka addition can be used.

[0084] When pH of stencil paper is measured by the hot water extraction method specified by

JIS-P-8113, mainly although the polyethylene with which that it is 5-9 cover a desirable stencil paper front face and a desirable rear face is the polyethylene (LDPE) of a low consistency, and/or polyethylene (HDPE) of high density, a part of other LLDPE(s), polypropylene, etc. can be used for it.

[0085] As for especially the polyethylene layer by the side of an ink absorbing layer, what added the titanium oxide of a rutile or an anatase mold in polyethylene as widely performed by the printing paper for photographs, and improved opacity and a whiteness degree is desirable. A titanium oxide content is 4 - 13 % of the weight preferably three to 20% of the weight in general to polyethylene.

[0086] polyethylene covering paper can also use the object in which a mat side which performs the so-called mold attachment processing and is acquired with the usual photographic printing paper, and the silky surface were formed, by this invention, in case melting push appearance also of also using as glossy paper is carried out and it coats polyethylene on a stencil paper front face.

[0087] After preparing an ink absorbing layer and a back layer, the amount of the polyethylene used of the front flesh side of stencil paper is damp and range whose 20-40-micrometer and back layer side the polyethylene layer by the side of an ink absorbing layer is 10-30 micrometers in general, although it is chosen so that the curl by highly-humid-izing may be optimized.

[0088] Furthermore, as for the above-mentioned polyethylene covering paper base material, it is desirable to have the following properties.

[0089] A lengthwise direction by the reinforcement specified by :JIS-P -8113 in hauling strength ** 2 thru/or 30kg. A lengthwise direction by the convention approach by JIS-P -8116 ** tear reinforcement with desirable longitudinal directions being 1 thru/or 20kg : 10 thru/or 200g. On the conditions specified to JIS-P -8119, ** compressibility $>= 103 \text{ kgf/cm}^2$ ** surface Beck smoothness with 20 thru/or desirable longitudinal direction 200g : 20 seconds or more, Although 500 seconds or more are especially preferably desirable as a glossy surface, especially 90% or more is desirable 85% or more by the approach by ** opacity:JIS-P -8138 which may be less than [this] in the so-called mold attachment article.

[0090] The approach of applying various kinds of hydrophilic layers prepared suitably if needed [, such as an opening layer, an under-coating layer, etc. of an ink jet record form of this invention,] on a base material can be suitably chosen from a well-known approach, and can be performed. A desirable approach paints the coating liquid which constitutes each class on a base material, dries and is acquired. In this case, coincidence spreading which can also apply more than two-layer to coincidence, and substitutes all hydrophilic binder layers for one spreading especially is desirable.

[0091] As a spreading method, the extrusion coat method which uses a hopper the roll coating method, a rod bar coating method, the air-knife-coating method, a spray coating method, the curtain method of application, or given in U.S. Pat. No. 2,681,294 is used preferably.

[0092] In case image recording is carried out using the ink jet record form of this invention, the record approach which used water color ink is used.

[0093] The water color ink said by this invention is the following coloring agent and a solvent object, and a record liquid that consists of other additives. Water soluble dye, such as direct dye well-known as a coloring agent at an ink jet, acid dye, basic dye, reactive dye, or a food dye, can be used.

[0094] As a solvent of water color ink, water and water-soluble, various organic solvents For example, methyl alcohol, isopropyl alcohol, n-butyl alcohol, Alcohols, such as tert-butyl alcohol and isobutyl alcohol; Dimethylformamide, Amides, such as dimethylacetamide; Ketones, such as an acetone and diacetone alcohol, or a ketone-alcohol; tetrahydrofuran, Ether, such as dioxane; Polyalkylene glycols; ethylene glycol, such as a polyethylene glycol and a polypropylene glycol, Propylene glycol, a butylene glycol, triethylene glycol, 1, 2, 6-hexane triol, thiodiglycol, hexylene glycol, Polyhydric alcohol, such as a diethylene glycol, a glycerol, and triethanolamine; Ethylene glycol methyl ether, The low-grade alkyl ether of polyhydric alcohol, such as the diethylene-glycol methyl (or ethyl) ether and the triethylene glycol monobutyl ether, is mentioned.

[0095] Also in the water-soluble organic solvent of these many, the low-grade alkyl ether of the

polyhydric alcohol of polyhydric alcohol, such as a diethylene glycol, triethanolamine, and a glycerol, and the triethylene glycol monobutyl ether etc. is desirable.

[0096] As an additive of other water color ink, a pH regulator, a sequestering agent, an antifungal agent, a viscosity controlling agent, a surface tension regulator, a wetting agent, a surfactant, a rust-proofer, etc. are mentioned, for example.

[0097] In order to make good wettability to an ink jet record form, as for water-color-ink liquid, in 20 degrees C, it is desirable to have the surface tension of 30 – 40 dyn/cm within the limits preferably 25 to 50 dyn/cm.

[0098]

[Example] Although the example of this invention is given and explained below, this invention is not limited to these examples. In addition, in an example, "%", as long as there is no notice especially, oven-dry-weight % is shown, and an addition shows the amount per two 1m of ink jet record forms respectively.

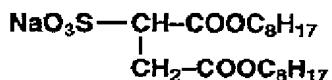
[0099] The front face whose example 1 mean particle diameter is about 0.07 micrometers added 160g of anionic ultrafine particle silica powder in 1000ml of pure water, and distributed with the high-speed homogenizer. Next, in this silica water dispersion (I), average degree of polymerization added gradually 5% polyvinyl alcohol water-solution (II) (surfactant -1 is contained 0.3% of the weight) 1600ml whenever [saponification / whose] is 90% by 1700. The high-speed homogenizer distributed the obtained liquid and translucent-like coating liquid was obtained.

[0100] Next, the coating liquid obtained as mentioned above was applied to the recording surface side on the paper base material (it is 9% of the weight of anatase mold titanium-dioxide content in the polyethylene layer by the side of 240 micrometers in thickness, and a recording surface.) which covered stencil paper both sides of 170 g/m² with polyethylene so that humid thickness might be set to 150 micrometers, and it was dried by the 20–40-degree C wind, and the ink jet record form -1 (example of a comparison) was obtained.

[0101]

[Formula 1]

界面活性剤-1



[0102] Next, it is an ink jet record form as well as the ink jet record form -1 except having changed as follows in the ink jet record form -1. - 2~9 were created.

[0103] [Ink jet record form -2] It is the same as the ink jet record form -1 except having changed polyvinyl alcohol water-solution (II) 1600ml into the mixed liquor of 800ml of 0.3-% of the weight water solutions of polyvinyl alcohol water-solution (II) 800ml and a surface active agent -1.

[0104] [Ink jet record form -3] It is the same as the ink jet record form -1 except having changed polyvinyl alcohol water-solution (II) 1600ml into the mixed liquor of 1070ml of 0.3-% of the weight water solutions of polyvinyl alcohol water-solution (II) 530ml and a surface active agent -1.

[0105] [Ink jet record form -4] It is the same as the ink jet record form -1 except having changed polyvinyl alcohol water-solution (II) 1600ml into the mixed liquor of 1200ml of 0.3-% of the weight water solutions of polyvinyl alcohol water-solution (II) 400ml and a surface active agent -1.

[0106] [Ink jet record form -5] It is the same as the ink jet record form -1 except having changed polyvinyl alcohol water-solution (II) 1600ml into the mixed liquor of 1280ml of 0.3-% of the weight water solutions of polyvinyl alcohol water-solution (II) 320ml and a surface active agent -1.

[0107] [Ink jet record form -6] Ink jet record form which applied to the coating liquid used for creating the ink jet record form -2 like [after adding 60ml of 2-% of the weight water solutions of tetraboric acid NATORIMU as a hardening agent and carrying out Hazama distribution with a

high-speed homogenizer for 30 minutes] the ink jet record form -2, and was obtained. [0108] [Ink jet record form -7] Ink jet record form which applied to the coating liquid used for creating the ink jet record form -3 like [after adding 50ml of 2-% of the weight water solutions of tetraboric acid NATORIMU as a hardening agent and carrying out Hazama distribution again with a high-speed homogenizer for 30 minutes] the ink jet record form -3, and was obtained. [0109] [Ink jet record form -8] Ink jet record form which applied to the coating liquid used for creating the ink jet record form -4 like [after adding 60ml of 2-% of the weight water solutions of tetraboric acid NATORIMU as a hardening agent and carrying out Hazama distribution again with a high-speed homogenizer for 30 minutes] the ink jet record form -4, and was obtained. [0110] [Ink jet record form -9] Ink jet record form which applied to the coating liquid used for creating the ink jet record form -5 like [after adding 70ml of 2-% of the weight water solutions of tetraboric acid NATORIMU as a hardening agent and carrying out Hazama distribution again with a high-speed homogenizer for 30 minutes] the ink jet record form -5, and was obtained. [0111] It evaluated about the following items [form / each / which was obtained / ink jet record].

[0112] (1) Glossiness : gloss was measured 60 degrees using the deflection glossmeter (VGS-1001DP) by Nippon Denshoku Industries Co., Ltd.

[0113] (2) The amount of openings : the thin line calculated the amount of the maximum ink which can be identified clearly as an amount of openings, without having printed the thin line pattern of void (un-printing) to the solid field of Y and M, and ink being full of it using the on-demand mold ink jet printer which can control ink discharge quantity.

[0114] Ink absorptivity : (3) Print a color picture with the Seiko Epson ink jet printer (MJ-5100C). O which evaluated the image quality in a high ink field : There is no crushing of the image of the shadow section by the ink overflow. Moreover, ** which the blot accompanying a crack does not have although there is crushing of the image of the shadow section by O:ink overflow which the blot accompanying a crack does not have, either : There is crushing of the shadow section. Moreover, x discriminable in general as an image although there is a blot accompanying a crack: Spread in connection with crushing of an image, the overflow of ink, and a crack, film peeling of the printing section is serious, and it is almost discernment impossible as an image.

[0115] (4) Film formation nature : the film formation nature of a film surface was judged on the following criteria before printing.

[0116]

O : although the film may separate slightly if there is no O:crack in which the film does not separate and it grinds against a finger strongly even if there is no crack and it grinds a front face against a finger strongly with 23 degrees C and 80% of relative humidity ** in which the film does not separate in the usual treatment: Although are easily wound at the time of conveyance with x:ink jet printer in which the film does not separate with an ink jet printer at the time of conveyance although it is in the crack condition minute on the whole surface, and it separates and falls or being automatically wound after spreading desiccation, separate and fall.

[0117] The obtained result is shown in Table 1.

[0118]

[Table 1]

| インクジェット記録用紙 | 光沢度 | 空隙量 | インク吸収性 | 造膜性 |
|--------------|-------|----------------------|--------|-----|
| 記録用紙-1 (比較例) | 7.2 % | 11 ml/m ² | △ | ○ |
| 記録用紙-2 (比較例) | 4.2 % | 14 ml/m ² | △ | △ |
| 記録用紙-3 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-4 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-5 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-6 (本発明) | 6.6 % | 15 ml/m ² | ○ | ◎ |
| 記録用紙-7 (本発明) | 6.2 % | 18 ml/m ² | ○ | ◎ |
| 記録用紙-8 (本発明) | 6.0 % | 22 ml/m ² | ○ | ◎ |
| 記録用紙-9 (本発明) | 5.6 % | 26 ml/m ² | ○ | ○ |

[0119] In the ink jet record form (1-5) which does not use a hardening agent from the result

shown in Table 1 When the quantity of the amount of the polyvinyl alcohol to a silica particle is decreased, the film formation nature as a coat falls. Although comparatively good film formation nature is obtained for the ratio of the silica to polyvinyl alcohol in 2-4 (ink jet record form - 1 two), the amount of openings is inadequate, in this range, ink absorptivity is insufficient and a good image is not obtained.

[0120] On the other hand, ink jet record form of this invention - It turns out that it has high glossiness and good ink absorptivity, maintaining good film formation nature, even if 6-9 have the outstanding film formation nature and it decreases the amount of polyvinyl alcohol to a silica.

[0121] Ink jet record form created in the example 2 example 1 - It is an ink jet record form like an example 1 except having changed polyvinyl alcohol into 89% of thing average degree of polymerization 700 and whenever [saponification] in 1-9. - 11-19 were created.

[0122] The ink jet record form was evaluated like the example 1, and the result shown in Table 2 was obtained.

[0123]

[Table 2]

| インクジェット記録用紙 | 光沢度 | 空隙量 | インク吸収性 | 造膜性 |
|----------------|-------|----------------------|--------|-----|
| 記録用紙-1 1 (比較例) | 4 8 % | 10 ml/m ² | × | △ |
| 記録用紙-1 2 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-1 3 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-1 4 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-1 5 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-1 6 (本発明) | 5 4 % | 14 ml/m ² | △ | ◎ |
| 記録用紙-1 7 (本発明) | 5 1 % | 19 ml/m ² | ◎ | ◎ |
| 記録用紙-1 8 (本発明) | 4 5 % | 22 ml/m ² | ○ | ○ |
| 記録用紙-1 9 (本発明) | 4 0 % | 25 ml/m ² | ○ | ○ |

[0124] When the low thing of the average degree of polymerization of polyvinyl alcohol is used from the result shown in Table 2, in not using a hardening agent, it turns out that film formation nature deteriorates also in an ink jet record form (- 1 two) with the comparatively high amount of polyvinyl alcohol, film formation nature is improved by use of a hardening agent, and the same effectiveness as an example 1 is acquired although the evaluation as an ink jet record form is almost impossible.

[0125] It is an ink jet record form like an example 1 except having changed polyvinyl alcohol into 88% of thing average degree of polymerization 3500 and whenever [saponification] in example 3 example 1. - 21-29 were created. The effectiveness same with having been obtained in the place evaluated like the example 1 and the example 1 was checked.

[0126] It sets in the example 4 example 1, and is an ink jet record form. - It is an ink jet record form like an example 1 except having changed the hardening agent into ethylene glycol diglycidyl ether in 6-9 (an addition being the same as that of an example 1). - 36-39 were created and it evaluated like the example 1. A result is shown in Table 3.

[0127]

[Table 3]

| インクジェット記録用紙 | 光沢度 | 空隙量 | インク吸収性 | 造膜性 |
|----------------|-------|----------------------|--------|-----|
| 記録用紙-3 6 (本発明) | 6 0 % | 13 ml/m ² | ○ | ○ |
| 記録用紙-3 7 (本発明) | 5 8 % | 17 ml/m ² | ○ | ○ |
| 記録用紙-3 8 (本発明) | 5 2 % | 21 ml/m ² | ◎ | ○ |
| 記録用紙-3 9 (本発明) | 4 7 % | 23 ml/m ² | ◎ | ○ |

[0128] The result of Table 3 shows having high film formation nature and ink absorptivity compared with hardening agent un-addition, although film formation nature is a little low compared with a way acid when a hardening agent is changed into epoxy compound.

[0129] Ink jet record form created in the example 5 example 1 - Ink jet record form added in 1-9 so that a glycerol might be changed in an opening layer at 0.5 g/m² - 41-49 were created and it evaluated like the example 1. The obtained result is shown in Table 4.

[0130]

[Table 4]

| インクジェット記録用紙 | 光沢度 | 空隙量 | インク吸収性 | 造膜性 |
|----------------|-------|----------------------|--------|-----|
| 記録用紙-4 1 (比較例) | 7 4 % | 11 ml/m ² | △ | ○ |
| 記録用紙-4 2 (比較例) | 4 6 % | 14 ml/m ² | △ | △ |
| 記録用紙-4 3 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-4 4 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-4 5 (比較例) | 測定不能 | 評価不能 | 評価不能 | × |
| 記録用紙-4 6 (本発明) | 7 2 % | 14 ml/m ² | ○ | ◎ |
| 記録用紙-4 7 (本発明) | 7 0 % | 17 ml/m ² | ◎ | ◎ |
| 記録用紙-4 8 (本発明) | 6 8 % | 21 ml/m ² | ◎ | ◎ |
| 記録用紙-4 9 (本発明) | 6 3 % | 25 ml/m ² | ◎ | ◎ |

[0131] Ink jet record form of the result shown in Table 4 to this invention – As for 46-49, it turns out that film formation nature and glossiness are further improved by addition of a glycerol.

[0132]

[Effect of the Invention] As mentioned above, if the configuration of the ink jet record form of this invention is used, the ink jet record form which has the opening structure of high ink absorptivity and moreover has high glossiness by the solid-state particle of the need minimum and use of a hydrophilic binder can be obtained.

[Translation done.]

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CORRECTION OR AMENDMENT

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| D21H | 5/00 | Z |

[Procedure revision]

[Filing Date] March 3, Heisei 12 (2000. 3.3)

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim 1

[Method of Amendment] Modification

[Proposed Amendment]

[Claim 1] The ink jet record form which is the opening layer in which at least one layer of this opening layer was formed of the flocculation of a hydrophilic binder and a non-subtlety particle on the base material in the ink jet record form which has at least one-layer opening layer, and is characterized by the bridge being constructed over this hydrophilic binder by the hardening agent.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0019

[Method of Amendment] Modification

[Proposed Amendment]

[0019] 1. Ink jet record form which is opening layer in which at least one layer of this opening layer was formed of flocculation of hydrophilic binder and non-subtlety particle on base material in ink jet record form which has at least one-layer opening layer, and is characterized by bridge being constructed over this hydrophilic binder by hardening agent.

[Translation done.]